whether children born of dark parents, where the mother formerly had issue by a European male, exhibit traces of the latter. But it was before stated (p. 1135), on the authority of two gentlemen long resident in Jamaica, that, in our West India colonies—in Jamaica, at least,—fruitful connections of this kind are of common occurrence (which I mention at present as in keeping with this) on the authority of Dr. Dyce, that, in children born under such circumstances, marks of the European have been observed. Special inquiry, made recently, has served so far to confirm these statements, but not to satisfy me that the issue of such connections is numerous.

"The opportunities, however, enjoyed by the Count de Strzelecki, of making observations as to this point, in most parts of the New World, have been very great. 'He has lived much (to use his own words) amongst different races of aborigines,—the natives of Canada, of the United States, of California, of Mexico, the South American Republics, the Marquesas, Sandwich, and Society Islands, and those of New Zealand and Australia.'* And, referring to the statement made by him, and already quoted, the Count observes—'*Hundreds of instances* of this extraordinary fact are on record in the writer's memoranda, *all recurring invariably under the same circumstances*, amongst the Hurons, Seminoles, Red Indians, Yakies (Sinaloa), Mendosa Indians, Araucos, South Sea Islanders, and natives of New Zealand, New South Wales, and Van Dieman's Land; and all tending to prove that the sterility of the female, which is relative only to one and not to another male, is not accidental, but follows laws as cogent, though as mysterious, as the rest of those connected with generation.' "†

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2. *On the Production and Disappearance of Sugar in the Animal Economy.* By M. Magendie. *Production of sugar in the economy.*—After describing the various modes in which sugar may be detected in the animal economy, M. Magendie observes, that, although it had been long known that sugar was formed in the urine, the mode of its formation only became known when the formation of that in vegetable bodies was discovered. If starch, derived from potatoes or other bodies containing it, is brought into contact with acids, sugar is found, and the same takes place if a ferment is added to it; *dextrine*, and then *glucose*, being formed in this latter case. This result is due to an active principle, found by MM. Payen and Persoz, in germinating barley, and called by them *diastase*, on decomposing which we obtain nitrogen, as well as oxygen, hydrogen, and carbon. How does this body separate the dextrine from the starch? How does it convert it into sugar and alcohol? It is a mystery; and to merely state that it is by catalysis, is only to avow our ignorance. We must, therefore, content ourselves with studying the phenomena. Thus, if we add iodine to a solution of starch, we produce a violet colour. If, in the same solution, we place a little diastase, the colour becomes rose, and, a little later, red—demonstrating first the existence of dextrine, and then that of sugar, which is afterwards produced.

Are there not, in the animal economy, analogous conditions to these, in which diastase is formed? The recent discovery of sugar in the economy, by M. Bernard, renders the inquiry one of the greatest interest. So many substances of the animal economy possess this power, as well as diastase, of transforming starch into sugar, that the greater difficulty would be, to point out those that do not possess it.

In respect to the action of the *saliva*, there are some distinctions to be observed. First, its quantity varies much in different animals. In the horse, for example, whose food requires prolonged mastication, it exists in very large quantities; there is but little in the dog and most carnivora, and hardly any in the cat. Again, the question whether the three salivary glands all furnish a similar fluid, has not been hitherto determined. The property of converting starch into sugar by the action of the animal diastase, is a means of deciding this. In the horse, a large alimentary bolus is formed, which remains long in the œsophagus, and the transformation of the amylaceous matter of its food

* Physical Description of New South Wales and Van Dieman's Land, p. 345.

† Op. cit., p. 347.

may be ascertained if we tie this canal. But if, by an opening into the parotid duct, we remove the fluid of the parotid gland, before it reaches the mouth, and place it in contact with starch, no such conversion into sugar occurs. It is the same, also, with the saliva drawn from the maxillary ducts in the dog. There is, then, in the buccal saliva something peculiar, dependent upon all its constituent principles. In fact, we have the fluid of the three glands united, mucus, atmospheric air, the absorption of oxygen, and a tendency to produce carbonic acid. The *pancreatic fluid* of itself effects the transformation.

Can the *gastric juice* convert alimentary bodies into sugar? It is a singular circumstance, that sometimes starch is promptly thus transformed, and sometimes not at all. The transformation takes place, if the juice is alkaline, like the saliva, but not if it is acid. If the acid gastric juice does not transform starch into sugar, it possesses the power of dissolving azotized aliments, such as meat. This difference in the juice, according as it has to act upon amylaceous or azotized substances, is one of M. Bernard's important discoveries, whence therapeutical applications may flow. As the acid of the stomach is the lactic, it is this we should prescribe for individuals whose digestion of animal food is difficult; while alkaline drinks are proper for those who digest vegetable aliment with difficulty.

Starch is also transformed into sugar in the *intestinal canal*, as shown experimentally by M. Magendie. The same change takes place when it is placed in contact with a solution, an infusion, or a decoction of the brain, spleen, pancreas, &c. The urine itself can effect this transformation. So, too, if starch be introduced by injection into the blood, it is converted into sugar. Thus, almost all parts of the body may contribute to transform alimentary starch into sugar; but the *liver alone* has the property of producing sugar *without* starch, as shown by M. Bernard's investigations. This same distinguished chemist has more recently shown that this production of sugar by the liver is under the influence of the nervous system. M. Bernard, after several experiments, discovered that, if the floor of the fourth ventricle is pierced within a very circumscribed space, in less than half an hour a very considerable quantity of sugar was found in the blood and urine, without the regimen of the animal having undergone any change whatever. This curious fact has naturally directed attention to the condition of the floor of the fourth ventricle in diabetic patients; and, in a recent autopsy, two dark spots, at the place where the part must be penetrated in order to produce the sugar, were observed. M. Bernard has been enabled to produce the same phenomenon in another manner, viz., by pricking or gently galvanizing the eighth pair in the neck; but the increased secretion so produced is of short duration. Another experiment, by its negative results, affords additional proof that this secretion of sugar is under the influence of the nervous system. The two nerves of the eighth pair are divided in the neck of the rabbit; and, if the animal survives the operation for some hours (which is necessary, in order that the sugar already formed in the liver may pass away into the circulation), the liver no longer, however treated, offers any traces of sugar.

The transformation of amidon into sugar, as also the natural production of sugar in the liver, appears, then, to be one of the great functions of the economy—one of the true conditions of existence. In late times, animals have been denied the property of producing sugar or fat, these bodies existing ready formed in the aliment. All now stated demonstrates, however, that the animal machine is not only a true sugar manufactory, but that it may even produce it without requiring even the alimentary starch for the purpose of conversion.

Disappearance of sugar from the economy.—In proportion as sugar is formed in the liver, it is carried away by the venous and arterial currents which traverse that organ, and it should therefore be found in the vessels proceeding from it; and M. Bernard has found it in the supra-hepatic veins, in the vena cava superior, and in the right cavities of the heart. But in other parts of the body the blood contains no sugar, or only very feeble traces of it. It is found neither in the veins constituting the vena cava inferior, in this trunk itself, nor in the splenic veins, and scarcely any traces are found in the blood of the veins returning from the head. Nevertheless, for about five hours *after the digestion of*

amylaceous substances, a notable quantity of sugar may be found in all the veins. This lapse of time shows that the sugar is destroyed only gradually, and that it is necessary for it to pass a great number of times through the lungs before it disappears entirely. Since we do not find the sugar produced by the liver after it has traversed the lungs, it must become destroyed in these organs. Here, then, is an entirely new fact. Something takes place in the respiratory process which was entirely unknown. May not this be the cause of animal heat? In spite of all the ingenuity of the illustrious Lavoisier's theory, he supported it by no direct proofs; for it is not only oxygen, but also nitrogen and hydrogen, which, passing into the blood, produce carbonic acid. There is nothing impossible, then, that from the destruction of sugar in the lungs the carbonic acid of respiration may result. [This doctrine has long been taught in Great Britain, especially since the researches of Dr. Buchanan of Glasgow demonstrated the existence of sugar in the blood, for a short time after the use of amylaceous articles of food.]

Respiration does not act in the same manner in the destruction of all species of sugar. If we inject a solution of cane sugar, mannite, or the sugar of milk, the whole of this sugar is found in the urine; but if we inject glucose or grape-sugar, unless a large quantity has been thus introduced, we do not find any in the urine. But, if the first-mentioned descriptions of sugar are not destroyed in the lungs, this is no longer the case when animals are fed by them. In this case, we no longer find cane-sugar in the urine, because, by digestion, it has been transformed into glucose, and decomposed by the lungs. Under these different circumstances, sugar is always tending to disappear from the economy. The first-named species, escaping the respiratory act, are eliminated by the urine; while glucose, which is the sugar of diabetes, is destroyed in the lungs.

The following table exhibits the quantity of the different kinds of sugar it is necessary to inject into the jugular, in order that they may be detected in the urine. Thus, there are physiological differences nowise indicated by chemistry; and it will be especially remarked that the sugar of the liver, *i. e.* the natural sugar of the economy, is destroyed in the act of respiration with far greater facility than the sugar proceeding from alimentary substances:—

Cane-sugar, ...	0.05
Mannite, ...	0.05
Sugar of milk, ...	0.25
Glucose, ...	2.50
Sugar of the liver, ...	12.00

Applications.—There are only two diseases known, in which the quantity of sugar in the economy has been proved to be increased, *phthisis* and *glucosuria.* It had been long observed that the urine, as well as the expectoration, of phthisical patients is sometimes saccharine; but a distinction must be made between such cases and those which only become phthisical as a result of diabetes. M. Bernard declares that the urine in true phthisis is not saccharine; but that the quantity found in the blood is much increased. Having observed such increase in the blood of a young girl, who had been bled, and whose urine exhibited no sugar, he predicted, although no other sign of phthisis was present, that she would fall a victim to this disease, which she did. But researches into this subject require to be multiplied. It is certain that diabetes induces, as one of its consequences, the most serious pulmonary affections; and now that we are aware that one of the functions of the lungs is to destroy the sugar as it is formed, we cannot be surprised at their becoming fatigued in the effort to decompose all that is formed. For this they do not suffice, and an immense quantity escapes by the urine. It is also found in the expectoration, in the matters vomited and passed by stool (M. Magendie has found large quantities in the cholera evacuations), and in the sweat. In this disease, which is characterized by emaciation, we find weakness of sight, loss of the generative faculties, sleeplessness, an excessive thirst, a voracious appetite, and active digestion, as if to furnish material for this incredible activity of fabrication; but, under this terrible influence, consumption arrives, and the patient is sometimes carried off with great rapidity.

Two distinguished chemists, MM. Bouchardat and Mialhe, have recently offered their explanations of the mode of production of this affection, and suggestions as to the best means of coping with it. According to M. Bouchardat, the diabetic urine proceeds from the transformation of fecula into sugar, and the quantity of this will be found to be great in proportion to the quantity of bread and feculent aliment consumed; and he advises a modification of the animalized regimen which had already been employed by Rollo, Thenard, Dupuytren, &c. He gives also a glutinous bread, containing only one-fifth of flour, and endeavours to regulate the functions of the skin by warm clothing, exercise, and the use of baths. In obstinate cases, he thinks well of the carbonate of ammonia as a medicine, only using the bicarbonate of soda when the glucose is in moderate quantity, and the urine simultaneously contains uric acid. Lime-water and magnesia, by retarding the solution of feculent matters, become useful adjuvants, being, however, of only temporary avail. According to M. Mialhe, the defective decomposition of sugar, and its passage into the urine, depend upon the insufficient alkalescence of the humours; it being, in his opinion, by the instrumentality of the alkalies of the blood and of the animal fluids, that digestion of amyloid and saccharine substances is effected. His treatment consists in the administration of the alkaline waters of Vichy, and the re-establishment of the functions of the skin, the alimentation becoming then a secondary consideration. To both these views of the nature of the disease, the natural production of sugar in the liver and the saturation of the blood by it when the eighth pair are excited at their origin, or in their course, present serious objections. To M. Mialhe's view may also be opposed the facts, that the blood, only slightly alkaline in its normal state, does not become acid in diabetes, and that a more alkaline fluid than it has been found, by M. Magendie's experiments, not to decompose the glucose. The serum of the blood of the horse is less alkaline than is that of man, and yet the sugar is just as easily destroyed in the one as the other. In fact, it is not by the alkali of the blood that such destruction is effected, but, as shown by M. Magendie, by the respiratory action. M. Bernard believes the disease to be an affection of the pneumogastric nerves: but we may also ask whether, in some cases, it may not arise from some peculiar alteration in the liver.—*Brit. and For. Med.-Chirurg. Rev.*, Oct. 1849, from a *Report of M. Magendie's Lectures at the College de France, by M. Fauconneau-Dufresne. L'Union Médicale*, Nos. 72, 75, and 79.

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3. *On the Physiological Anatomy of the Spleen.*—Dr. W. R. Sanders arrives at the following conclusions, which he gives at present without any details:—

I. The Malpighian glandulæ or sacculi, and the pulp of the spleen, constitute a true secreting apparatus.

A. The Malpighian sacculi are hollow, spherical, membranous bags, completely closed, and filled with organized contents; they are attached to the trabeculæ by an arterial pedicle, and are imbedded in the pulp.

Saccular Membranes.—The outer membrane of the sacculi is fibrous, and contains *arterial* ramifications and numerous capillaries; their inner membrane is granular.

Saccular Contents.—On the inner surface of the membrane is applied a complete layer of nucleated cells; which are clear (not granular), of about 1-1200th inch diameter, and of a light yellowish colour, when not altered by the action of water. The rest of the interior of the sacculus is filled up by free corpuscles (containing nucleoli) of a light grayish colour, and of about 1-4000th inch diameter, corresponding precisely with the nuclei of the cells, and by a homogeneous or slightly granular plasma.

The perfection of the forms, the constancy and uniformity of appearance of these corpuscular elements, together with their reactions under water, acetic acid, &c., are extremely characteristic, so that they are easily and distinctly recognized. There is also evidence of the growth and maturation of the sacculi. This part, therefore, of the glandular anatomy of the spleen exhibits characters as perfect and as truly distinctive as the glandular elements of the liver, kidneys, salivary glands, &c.